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10/707,362	12/09/2003	Cheng-Jung Chen	VASP0002USA	1361

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EXAMINER
LUI, DONNA V

ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/707,362	CHEN ET AL.	
	Examiner	Art Unit	
	Donna V. Lui	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ham (Pub. No.: US 2002/0196218 A1) in view of Lee (Pub. No.: US 2003/0098839 A1).

With respect to **Claim 1**, Ham discloses a driving method of a liquid crystal display *(See figure 6, [0064])*, the liquid crystal display comprising: a liquid crystal panel *(element 67)*, the liquid crystal panel comprising: a plurality of scan lines *(element 66)*; a plurality of data lines *(element 65)*; and a plurality of pixels *([0066]; the pixel is comprised of elements TFT, Clc, and Vcom)*, each pixel is connected to a corresponding scan line and a corresponding data line, and each pixel has a switching device connected to the corresponding scan line and the corresponding data line *(through the TFT)*. Ham teaches the driving method comprising: continuously providing scan voltages to the scan lines *([0068]; note that the gate driver sequentially generates a scanning pulse which is equivalent to continuously providing scan voltages to all the scan lines)*; receiving an M-bit image data from an image data input terminal *([0071]; M= 8 bits)*; extracting N most significant bits (MSB) of the M-bit image data to form an N-bit image data *([0072]; N= 4 bits)*, N is smaller than M *(N= 4 bits < M= 8 bits)*; delaying the N-bit image data by a frame period to form an N-bit delayed image data *([0072]; delayed image*

is equivalent to the previous frame Fn-1 where the MSB data is N); comparing P MSB of a current M-bit image data *(current image data is in the frame Fn where P= 4 bits and equals N)* with the N-bit delayed image data to determine a result value *(See figure 7; [0074], lines 1-5)*; if the result value equals a first result value *(|b-a| = 0: current MSB – delayed MSB = 0)*, selecting a first image value from a reference table in accordance with the P MSB and the N-bit delayed image data and forming a first data voltage according to the first image value *([0075], lines 3-8)*, and providing the first data voltage to the corresponding data line *([0069], lines 1-8)*; and if the result value equals a second result value *([0076], lines 1-6; |b-a| = 1)*, forming a second data voltage in accordance with the current M-bit image data and providing the second data voltage to the corresponding data line *(See figure 8, if the comparison is equal to one, the need for modulation is determined and the appropriate steps are performed for providing voltage to the data line)*.

Ham does not teach selecting an M-bit first image value from a reference table in accordance with the P MSB and the N-bit delayed image data and forming a first data voltage according to the M-bit first image value.

Lee teaches selecting an M-bit first image value from a reference table *(See figure 6, note that the stored value is 8-bits; [0097]; M-bit image is equivalent to 8-bits of gray scale; reference table is equivalent to LUT)* in accordance with the P MSB and the N-bit delayed image data *(See figure 6, note that the reference table is a function of the present and previous image data; [0104], lines 1-4)* and forming a first data voltage according to the M-bit first image value *([0105]; See figure 9, note that the first data voltage is represented by Gn')*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to select an M-bit first image value from a reference table in accordance with the P MSB and the N-bit delayed image data and forming a first data voltage according to the M-bit first image value, as taught by Lee to the driving method of Ham so as to enhance the efficiency of the data voltage modification *(Ham: [0089], last two lines)*.

With respect to **Claim 6**, Claim 6 differs from claim 1 in that claim 1 recites the limitation "if the result value equals a second result value, forming a second data voltage in accordance with the current M-bit image data and providing the second data voltage to the corresponding data line" whereas claim 6 recites the limitation "if the result value equals a second result value, selecting a second image value from a reference table in accordance with the P MSB and the N-bit delayed image data and forming a second data voltage in accordance with (M-Q)MSB of the second image value and Q least significant bits (LSB) of the current M-bit image data, and then providing the second data voltage to the corresponding data line".

Ham teaches if the result value equals a second result value *([0076], lines 1-6; $|b-a| = 1$)*, selecting a second image value from a reference table in accordance with the P MSB and the N-bit delayed image data and forming a second data voltage in accordance with (M-Q)MSB of the second image value and Q least significant bits (LSB) of the current M-bit image data *(the LSB data are c and d of the previous and current frame respectively, where the number of bits are c = d = Q = 4 bits, thus M-Q =4 bits; the LSB data is used to determine whether modulation is required)*, and then providing the second data voltage to the corresponding data line *(See figure 8, through either normal or high-speed driving)*.

With respect to **Claim 11**, Ham discloses a driving circuit for driving a liquid crystal display *(See figure 6, [0064])*, the liquid crystal display comprising: a liquid crystal panel *(element 67)*, the liquid crystal panel comprising: a plurality of scan lines *(element 66)*; a plurality of data lines *(element 65)*; and a plurality of pixels *([0066]; the pixel is comprised of elements TFT, Clc, and Vcom)*, each pixel is connected to a corresponding scan line and a corresponding data line, and each pixel has a switching device connected to the corresponding scan line and the corresponding data line *(through the TFT)*. Ham teaches the driving circuit comprising: a scan line driving circuit for continuously providing scan voltages to the scan lines *([0068]; note that the gate driver sequentially generates a scanning pulse which is equivalent to continuously providing scan voltages to all the scan lines)*; an image data input terminal for receiving an M-bit image data *(See figure 6, element 61)*; a bit processor *(element 62)* for extracting N most significant bits (MSB) from the M-bit image data to form an N-bit image data *([0070]; [0072], M = 8 bits, N = 4 bits)*, N is smaller than M *(N= 4 bits < M= 8 bits)*; an image memory *(See figure 9, element 91; [0078]; [0079], lines 6-10)* for storing the N-bit image data and delaying the N-bit image data by a frame period *([0080], N-bit data are MSB data)*; a comparison circuit *(See figure 9, element 93)* for comparing P MSB of a current M-bit image data with the N-bit delayed image data to determine a result value; a lookup table *(LUT, element 95; [0080])* for outputting an image value in accordance with the P MSB and the N-bit delayed image data *(See figure 9 where the output of the LUT is outputted to the multiplexer MUX)*; a multiplexer for outputting the image value or outputting the M-bit image data in accordance with the result value *([0084], lines 1-5)*; and a data line driving circuit for forming a data voltage in

accordance with output of the multiplexer, and providing the data voltage to the corresponding data line ([0086]).

Ham does not teach a lookup table (LUT) for outputting an M-bit image value in accordance with the P MSB and the N-bit delayed image data.

Lee teaches a lookup table (LUT) *(See figure 6, note that the stored value is 8-bits; [0097]; M-bit image is equivalent to 8-bits of gray scale)* for outputting an M-bit image value in accordance with the P MSB and the N-bit delayed image data *(See figure 6, note that the LUT is a function of the present and previous image data; [0104], lines 1-4; [0105]; See figure 9, note that the first data voltage is represented by Gn').*

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to have a lookup table for outputting an M-bit image value in accordance with the P MSB and the N-bit delayed image data, as taught by Lee to the driving circuit of Ham so as to enhance the efficiency of the data voltage modification *(Ham: [0089], last two lines).*

With respect to **Claim 16**, Claim 16 differs from claim 11 in that claim 11 recites the limitation "a multiplexer for outputting the M-bit image value or outputting the M-bit image data in accordance with the result value; and a data line driving circuit for forming a data voltage in accordance with output of the multiplexer, and providing the data voltage to the corresponding data line" whereas claim 16 recites the limitation "a multiplexer for outputting Q least significant bits (LSB) of the image value or outputting Q LSB of the M-bit image data in accordance with the result value; and a data line driving circuit for producing a data voltage in accordance with

output of the multiplexer and (M-Q) MSB of the image value, and providing the data voltage to the corresponding data line".

Ham teaches a multiplexer for outputting Q least significant bits (LSB) of the image value or outputting Q LSB of the M-bit image data in accordance with the result value *([0084], lines 1-5; [0085], lines 11-22; the LSB data are c and d of the previous and current frame respectively, where the number of bits are c = d = Q = 4 bits,)*; and a data line driving circuit for producing a data voltage in accordance with output of the multiplexer and (M-Q) MSB of the image value, and providing the data voltage to the corresponding data line *([0086])*.

With respect to **Claims 2 and 7**, Ham does not teach producing a temperature compensation signal in accordance with temperature of the liquid crystal panel; and selecting a reference table from a plurality of tables in accordance with the temperature compensation signal.

Lee teaches producing a temperature compensation signal *([0129], lines 5-14)* in accordance with a temperature of the liquid crystal panel and selecting *(See figure 9, element 445; [0130], lines 1-6)* the reference table from a plurality of tables *(See figure 9, element 441)* in accordance with the temperature compensation signal.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to produce a temperature compensation signal in accordance with a temperature of the liquid crystal panel and selecting the reference table from a plurality of tables in accordance with the temperature compensation signal, as taught by Lee to the method of Ham

so as to improve the response speed of the liquid crystal *(Ham: [0082], last two lines)* and to enhance the efficiency of the data voltage modification *(Ham: [0089], last two lines)*.

With respect to **Claims 3, 8, 13 and 18**, the driving method and driving circuits of Ham as modified by Lee respectively of claims 1, 6, 11 and 16 respectively, teach a reference table is recorded with 2^N x 2^P image data values *(See figure 6; note that N = P)*.

With respect to **Claims 4, 9, 14, and 19**, the driving method and driving circuits of Ham as modified by Lee respectively of claims 1, 6, 11, and 16, Ham teaches the frame memory storing most significant bit data MSB can be set to high-order 3 or 4 bits, but may be set up to 5 or 6 bits if needed *([0014])*. Ham teaches P MSB equals N MSB *(See figure 7, note that MSB data b and a are both 4 bits)*.

Ham does not mention that P MSB from the second extracted image data is greater than N MSB of the first extracted image data.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to have P greater than N because Applicant has not disclosed that having P greater than N provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with having P equal to N because both having P equals N and P greater than N provide the same purpose for reducing the size of memory for high-speed driving.

Therefore, it would have been an obvious matter of design choice to modify Ham to obtain the invention as specified in Claims 1, 6, 11, and 16.

With respect to **Claims 5, 10, 15 and 20**, the driving method and driving circuits of Ham as modified by Lee respectively of claims 1, 6, 11 and 16 respectively, teach P equals N *(See figure 6; note that N = P)*.

With respect to **Claims 12 and 17**, Ham does not teach a temperature detector for detecting temperature of the liquid crystal panel, and producing a temperature compensation signal in accordance with temperature of the liquid crystal panel; a memory for storing a plurality of tables; and a selector for selecting a reference table from the plurality of tables stored in the memory in accordance with the temperature compensation signal, and transferring the selected reference table to the LUT to make the LUT output the M-bit image value in accordance with the selected reference table.

Lee teaches a temperature detector *([0129], lines 5-14; temperature detector is equivalent to a sensor)* for detecting temperature of the liquid crystal panel, and producing a temperature compensation signal in accordance with temperature of the liquid crystal panel; a memory for storing a plurality of tables *([0087], lines 3-5; memory is equivalent to ROM)*; and a selector for selecting a reference table from the plurality of tables stored in the memory in accordance with the temperature compensation signal *(See figure 9, element 445; [0130], lines 1-6)*, and transferring the selected reference table to the LUT to make the LUT output the M-bit image value in accordance with the selected reference table *([0133], lines 8-11; [0134])*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to use a temperature detector for detecting temperature of the liquid crystal panel, and producing a temperature compensation signal in accordance with temperature of the liquid crystal panel; a memory for storing a plurality of tables; and a selector for selecting a reference table from the plurality of tables stored in the memory in accordance with the temperature compensation signal, and transferring the selected reference table to the LUT to make the LUT output the M-bit image value in accordance with the selected reference table, as taught by Lee to the driving circuit of Ham so as to improve the response speed of the liquid crystal *(Ham: [0082], last two lines)* and to enhance the efficiency of the data voltage modification *(Ham: [0089], last two lines)*.

Response to Arguments

3. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

4. Applicant's arguments filed 8/8/2006 have been fully considered but they are not persuasive.

Applicant argues that Ham teaches the LUT 95 of figure 9 only provides the modulated most significant bit data mb in place of the non-modulated most significant bit data b. Applicant argues that a modulated version of the least significant bit data d is not provided by LUT 95.

The claim recites the limitation ;"a lookup table (LUT) for outputting an image value in accordance with the P MSB and the N-bit delayed image data", which does not require a least

significant bit data to be provided by the LUT. Ham teaches a lookup table for outputting an image value to the MUX where the MUX outputs an image value in accordance with the P MSB and the N-bit delayed image data *(See figure 9; [0085], lines 20-22; [0086])*. The examiner is not precluded from using additional circuitry in order to arrive at an equivalent result.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donna V. Lui whose telephone number is (571) 272-4920. The examiner can normally be reached on Monday through Friday 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on (571)272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Donna V Lui
Examiner
Art Unit 2629

AMR A. AWAD
SUPERVISORY PATENT EXAMINER